

REMARKS

Claims 1-39 are pending in the current application. Applicants have amended claims 1, 4, 7, 16, and former claim 25, now claim 27, for purposes of correcting minor wording errors not unrelated to issues of patentability. Applicants have renumbered claims 16-17 (second occurrence) and 18-37 as suggested by the Examiner, again not for issues related to patentability. Reexamination and reconsideration of all of the claims are respectfully requested.

IDS

Applicants include herewith a copy of the de Groot paper per the request of the Examiner. Applicants had included this reference in the initial IDS, which apparently did not reach the Examiner. Applicants therefore submit no fee is due in accordance with this retransmittal of the reference at this time.

“first diffraction grating”

The Examiner rejected certain claims including claims 1, 4, and 7 based on use of the term “diffraction grating” and “first diffraction grating.” Applicants have corrected a minor wording error with claims 1, 4, and 7 to provide uniform usage of the phrase “first diffraction grating,” and Applicants submit that this correction of a clerical error not related to issues of patentability places all claims in proper form.

Specification

The Examiner noted a numbering dispute with respect to claims 16 and 17, and subsequent claims 18-37. Applicants have corrected claim numbering as suggested by the Examiner.

§ 103

The Examiner rejected claims 1-39 based on de Groot, USP 6,249,351 (“the de Groot reference”). Applicants respectfully traverse this rejection.

The present disclosure is directed to inspecting a Copper CMP processed wafers. As noted in the Summary at page 7 of the application:

The light energy transmitted from the low coherence light source is dimensioned in conjunction with the collimator and diffraction grating to provide a narrow swath of light energy over a predetermined area of the wafer having a known pattern or set of characteristic features located thereon. Examination of a wafer to determine the overall quality of the wafer comprises a multiple point examination of the wafer, typically a five point inspection of known characteristic features on the specimen to determine the overall quality of the chemical-mechanical planarization process on the particular wafer. (Emphasis added).

Thus inspection of a portion of the wafer, namely a predetermined area of the wafer having a known pattern or set of characteristic features located thereon, provides an assessment of the overall quality of the wafer without need for an inspection of the entire wafer.

In contrast, the de Groot reference does not mention CMP wafers or the issues associated therewith, and teaches no such determination of the quality of the entire wafer surface using an inspection of a portion of the wafer, or inspection of a predetermined area of the wafer having a known pattern or set of characteristic features located thereon. Applicants contend that the de Groot reference in pertinent part discusses full inspection of the entire wafer surface, in particular with respect to FIG. 7, which tends to teach away from the express limitations contained in, for example, claim 1 of the present application.

The Office Action states in part that de Groot includes, as part of FIG. 7, “a specimen surface having [] predetermined standardized characteristics.” It is unclear precisely where the de Groot reference specifically discloses “predetermined standardized characteristics.” At Column 2, line 4 et seq., for example, de Groot states “The measurement wavefront reflects from the sample surface at a grazing angle. The interferometer also includes ... an optical imaging system to generate *an image of the sample surface...*” (emphasis added). The Office Action also alleges that while the de

Groot reference “does not expressly say that the light energy passes only over a portion comprising less than half the specimen surface”, one of ordinary skill would have done so.

First, the express limitation in claim 1 is the following: “said first diffraction grating passes light energy only over a portion of the specimen surface having predetermined standardized characteristics, said portion comprising less than half of the specimen surface.” These are not two separate limitations (wafer having predetermined characteristics, separate and distinct from examining less than half the wafer), but one combined limitation. From the entirety of the language of this limitation, the diffraction grating necessarily passes light energy over a portion of the specimen having predetermined standardized characteristics, the portion comprising less than half of the specimen surface. No such combined requirement or limitation is disclosed or suggested by the de Groot reference. As noted, de Groot does not disclose a specimen surface having predetermined standardized characteristics, and thus does not disclose nor suggest a diffraction grating passing light energy over a portion of a specimen surface having predetermined standardized characteristics. In short, the de Groot reference does not show the combined limitation included in claim 1.

The Office Action relies in part on purported knowledge of one skilled in the art at the time of the invention. In accordance with 37 C.F.R. § 1.104 (d)(2) and to preserve Applicants’ argument on appeal, Applicants request that the Examiner provide an affidavit that supports the rejection of the claims based on the official notice, common knowledge, or personal knowledge of the Examiner, or provide a reference demonstrating the purported common knowledge. *See In re Lee*, 277 F.3d 1338, 1344-45, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002) (finding that reliance on “common knowledge and common sense” did not fulfill the PTO’s obligation to cite references to support its conclusions, as PTO must document its reasonings on the record to allow accountability and effective appellate review); *see also, In re Zurko*, 59 USPQ2d 1693 (Fed. Cir. 2001) (“This assessment of basic knowledge and common sense was not based on any evidence in the record and, therefore, lacks substantial evidence support. ... With respect to core factual findings in a determination of patentability, however, the Board cannot simply

reach conclusions based on its own understanding or experience -- or on its assessment of what would be basic knowledge or common sense”); Manual of Patent Examining Procedure 2144.03 (“If the applicant traverses [] an assertion [that a concept is ‘well known’ or ‘matters of common knowledge’] the examiner should cite a reference in support of his or her position.”). Applicant requests the Examiner produce a reference showing “pass[ing] light energy only over a portion of the specimen surface having predetermined standardized characteristics, said portion comprising less than half of the specimen surface,” or an affidavit in support of the rejection.

Applicants dispute the assertion that the de Groot reference “is capable of performing the intended use [examining a portion of the surface having predetermined standardized characteristics].” The de Groot design, including that of FIG. 7, does not show a diffraction grating that passes light energy only over a portion of the specimen surface having predetermined standardized characteristics, or is capable of such passing. The diffraction gratings of de Groot pass the light energy over the entire surface. The elements used in the de Groot FIG. 7 design apparently contemplate scanning the entire surface, not a portion thereof having predetermined standardized characteristics located thereon. As such, the de Groot reference will take considerably more time and more expensive equipment to perform scanning of the entire surface, a problem overcome by the present invention. Thus scanning a portion of the surface having predetermined standardized characteristics to determine the quality of the entire specimen is not shown and the claim is therefore not met.

Further, no motivation to combine the de Groot reference with the purported “common knowledge” exists in the de Groot reference itself. As noted above, de Groot only scans a wafer surface, not a portion of the surface having predetermined standardized characteristics. The de Groot reference does not mention CMP surfaces nor the specific problems associated therewith. There is simply nothing in de Groot which would suggest combining the reference(s) as claimed by the Office Action. The benefits of the claimed invention are nowhere discussed in the reference, and there is no teaching in the reference which suggests the combination cited in the Office Action. Applicants contend that it is only by using hindsight that the Applicants’ invention can be constructed.

The Federal Circuit has held that obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital System, Inc. v. Montefiore Hospital*, 732 F.2d 1572 (Fed. Cir. 1984). Without some showing in the prior art that suggests in some way a combination in order to arrive at the claimed invention, it is impermissible to use the Applicant's teaching to search references for the claimed elements and combine them as claimed. *In Re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991); *In Re Laskowski*, 871 F.2d 115, 117 (Fed. Cir. 1989); *see also, Ex Parte Lange*, 72 U.S.P.Q. 90, 91 (C.C.P.A. 1947) ("It seems to us that the Examiner is using appellant's disclosure for the suggestion of the combination since there is no suggestion in any of the patents for their combination in the manner claimed by Applicant."); *In re Leonor*, 158 U.S.P.Q. 20, 21 (C.C.P.A. 1968) (the issue is "whether teachings of prior art would, of themselves, and without benefit of applicant's disclosure, suggest [a process] which would make claimed invention obvious...") (emphasis in original). The de Groot reference does not suggest combining the reference with the alleged common knowledge to produce the unique system claimed in Applicants' claim 1.

Applicant respectfully submits that the Examiner has used hindsight in rejecting the claims herein. It is only through hindsight, after seeing Applicant's disclosure, that it would be considered possible to create the system for scanning a portion of the specimen surface claimed by the Applicant.

With regard to the use of hindsight, or the use of the Applicant's teaching to combine references, the courts have universally condemned such combinations and have upheld the validity of patents or claims of patents in which such hindsight was employed to combine the references. *W.L. Gore Associates, Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983), (condemning the "insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher"); *In re Fine*, 837 F.2d 1044, 1051 (Fed. Cir. 1988) ("One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.") Applicant respectfully submits that combination of aspects of the de Groot reference with alleged common knowledge is merely a hindsight reconstruction of the invention. Such hindsight

reconstruction of the claimed system is inappropriate and thus rejection of claim 1 for this reason is improper.

Independent claims 16 and 27 include the following limitations similar to that discussed above: -“directing said diffracted light energy toward a predetermined portion of said specimen surface having predetermined standardized characteristics ... wherein said predetermined portion comprises less than half of the specimen surface” (claim 16 as amended), “disposing a swath of nonzero order light energy having approximate predetermined dimension across said surface of said specimen ... said swath covering less than approximately half of the surface area of the specimen ... wherein said disposing comprises disposing light energy to a portion of said surface having predetermined standardized characteristics” (claim 27 as amended). These limitations, as with claim 1, are not disclosed nor suggested by the de Groot reference, and there is no motivation to combine the de Groot reference with the alleged common knowledge to produce the claimed inventions.

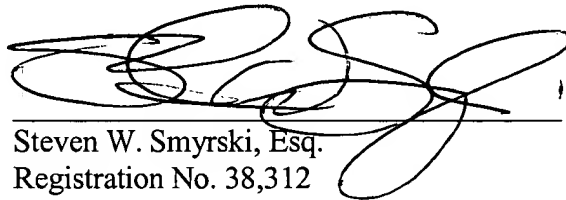
All claims dependent from these allowable independent claims 1, 16, and 27 are allowable as they depend from an allowable base claim. Accordingly, it is respectfully submitted that all claims fully comply with 35 U.S.C. §103.

CONCLUSION

In view of the foregoing, it is respectfully submitted that all claims of the present application are in condition for allowance. Reexamination and reconsideration of all of the claims, as amended, are respectfully requested and allowance of all the claims at an early date is solicited.

Should it be determined for any reason an insufficient fee has been paid, please charge any insufficiency to ensure consideration and allowance of this application to Deposit Account 502026.

Respectfully submitted,



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Date: July 23, 2003

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE CLAIMS**

Claim 2 has been amended as follows:

2. (Amended) A system for performing a scan of a portion of a specimen surface, comprising:

a low coherence light energy generating device;

a collimator for collimating light energy received from said low coherence light energy generating device;

a first diffraction grating for receiving light energy transmitted from said collimator and passing nonzero order light energy toward said specimen;

a reflective surface for receiving predetermined order light energy from said diffraction grating;

a second diffraction grating for receiving light reflected from said specimen and from said reflective surface;

a collimator for receiving light energy from said second diffraction grating; and

a camera for receiving light energy from the receiving collimator;

wherein said first diffraction grating passes light energy only over a portion of the specimen surface having predetermined standardized characteristics, said portion comprising less than half of the specimen surface.

Claim 4 has been amended as follows:

4. (Amended) The system of claim 2, further comprising a blocking element for blocking passage of zero order light energy received from said first diffraction grating.

Claim 7 has been amended as follows:

7. (Amended) The system of claim 2, wherein nonzero order light energy passes from said first diffraction grating toward said reflective surface and said specimen.

Claim 16 has been amended as follows:

16. (Amended) A method for inspecting a portion of a surface of a specimen, comprising [the steps of]:

transmitting light energy toward said specimen;

diffracting said light energy into predetermined order light energy;

directing said diffracted light energy toward a predetermined portion of said specimen surface [portion of said surface] having predetermined standardized characteristics and simultaneously toward a reflective surface mounted substantially parallel to said specimen surface, wherein said predetermined portion comprises less than half of the specimen surface;

receiving predetermined order light energy reflected from said specimen and said reflective surface and combining the received light energy; and

directing said light energy to a light receiving device.

Claims 16 and 17 (second occurrence) and 18-25 have been renumbered as follows:

[16.]18. The method of claim 17, wherein said diffracting step comprises diffracting for zero intensity of the zero order of the light energy received.

[17.]19. The method of claim 16, further comprising the step of initially calibrating the system prior to said transmitting step.

[18.]20. The method of claim 16, wherein said light energy forms an image, and said directing step comprises altering the image aspect ratio.

[19.]21. The method of claim 16, wherein said method provides light energy to a strip extending from at least a center of said specimen to an edge of said specimen.

[20.]22. The method of claim 16, wherein said method addresses and assesses at least one of the anomalies from a group comprising global planarization, erosion, and dishing.

[21.]23. The method of claim 16, wherein said method is integrated into a CMP process line.

[22.]24. The method of claim 16, wherein said specimen comprises a CMP processed wafer, and said specimen comprises one from the group including:

- (a) unpatterned wafers with film;
- (b) patterned test wafer with test mask;
- (c) patterned production wafer with combination of product and test mask;
- and
- (d) patterned production wafers free of test masks.

[23.]25. The method of claim 16, wherein said light receiving device comprises a camera having zoom capabilities.

[24.]26. The method of claim 24, further comprising translating components to provide a reduced field of view when using the camera zoom capabilities.

Claim 25 has been amended and renumbered as follows:

[25.]27. (Amended) A method for inspecting a surface of a specimen, said surface having a surface area, comprising:

disposing a swath of nonzero order light energy having approximate predetermined dimension across said surface of said specimen while simultaneously transmitting predetermined order light energy toward a reflective surface, said swath covering less than approximately half of the surface area of the specimen; and

combining light energy received from said surface and said reflective surface;

wherein said disposing [step] comprises disposing light energy to a portion of said surface having predetermined standardized characteristics.

Claims 26-37 have been renumbered as follows:

[26.]28. The method of claim [23]27, wherein said predetermined order light energy comprises nonzero order light energy.

[27.]29. The method of claim [23]27, further comprising collimating light energy prior to said disposing step.

[28.]30. The method of claim [24]28, further comprising diffracting light energy transmitted from said collimating step and passing diffracted nonzero order light energy toward said specimen.

[29.]31. The method of claim [26]30, further comprising diffracting and collimating light received from said combining step.

[30.]32. The method of claim [27]31, further comprising blocking passage of zero order light energy received from said diffracting step.

[31.]33. The method of claim [23]27, further comprising converting an image of said portion of said specimen into an image having an aspect ratio closer to 1:1.

[32.]34. The method of claim [24]28, wherein said collimating step employs at least one lens.

[33.]35. The method of claim [24]28, wherein said diffracting step is optimized for zero intensity of the zero order of the light energy.

[34.]36. The method of claim [23]27, wherein said method provides light energy to a strip extending from at least a center of said specimen to an edge of said specimen.

[35.]37. The method of claim [23]27, wherein said method addresses and assesses at least one of the anomalies from a group comprising global planarization, erosion, and dishing.

[36.]38. The method of claim [23]27, wherein said method is integrated into a CMP process line.

[37.]39. The method of claim [23]27, wherein said specimen comprises a CMP processed wafer, and said specimen comprises one from the group including:

- (a) unpatterned wafers with film;
 - (b) patterned test wafer with test mask;
 - (c) patterned production wafer with combination of product and test mask;
- and
- (d) patterned production wafers free of test masks.